CITY OF HOUSTON COMMENTS

PS Docket No. 17-344

The City of Houston appreciates the opportunity to provide comments on response efforts related to the 2017 hurricane season. The comments below reflect the input of the Houston Emergency Center (HEC), the Houston Police Department (HPD), the Houston Fire Department (HFD), the Houston Information Technology Department (HITS), and the Mayor's Office for People with Disabilities.

A. Questions Regarding Impacts to Communications Infrastructure

1. What were the major causes of communications outages due to the hurricanes? Were there unique factors that affected outages and/or resilience during any particular hurricane?

   Hurricane Harvey presented a huge flood event that inundated some of HPD's communications buildings causing electrical power to be knocked out for extended periods of time. The primary cause was outdated building infrastructure which had electrical switch components installed below the possible waterlines.

   Flood waters in general were the leading cause of outages in the Houston area. In most cases, the water either interrupted the facility power or inundated the actual electronics equipment providing the communication services.

2. What were the cascading effects of communications outages? Did communications service outages have impacts on supervisory control and data acquisition systems (SCADAs) of other critical infrastructure?

   For HPD, data communications failures from the flooding caused Field Officers to not be able to utilize their mobile technology which caused both an Officer Safety concern not being able to access CJIS Information but also caused delays in dispatching units to calls normally handled by mobile CAD Systems.

   While damaged, many of the City's facilities could have at least been partially occupied after the rain stopped. However, without connectivity for their communications/business systems they were forced to seek alternative locations or solutions.

3. To what extent was the communications infrastructure resilient to the hurricanes? What methods were employed prior to hurricane landfall to address infrastructure resiliency?

   Water barriers were placed at known entry points but the flood event surpassed the height of those barriers, entering some electrical switch rooms.

   The Land Mobile Radio (LMR) infrastructure was very resilient. Only two of the 58 sites suffered prolonged outages. One was due to 6+ feet of water entering the site and also inundating the generator. The other site was off line due to debris damaging the main electrical service.

The LMR site generators were started 12 hours before expected landfall and ran for the duration of the event. This mitigated the risk of generator "over cranks." However, due to the duration of the event, it created an issue with oil usage that then needed to be addressed taking some available high-water resources away from the response efforts. Funds permitting, we expect to take steps to mitigate the oil issue by doubling the oil capacity for the generators at each site.

4. Are there industry best practices that address communications operations in high risk areas (*e.g.*, flood, high-wind areas)? If so, were these practices implemented and did they prevent and/or mitigate outages? To what extent do these best practices involve cross-industry and/or government participation and was such participation effective?

   Houston IT Services reviewed the City's Continuity of Operations Plan (COOP) days prior to the event and took steps to alert our vendor support, stage personnel at key locations (such as our data centers), and establish standard communication protocols to ensure a continuity of service delivery. The City also had representatives from our wireless provider in the Emergency Operations Center for the duration of the event.

B. Questions Regarding the FCC's Response

1. Are there actions that the FCC could take to improve the support and coordination it provides to industry and government (federal and SLTT) partners? For example, was the FCC support to Emergency Support Function #2 effective?[1]

   The FCC provided support through our State Emergency Operations Center and were extremely responsive to the City's needs. Real-time or near real-time wireline and wireless network outage reports displayed graphically on a map would be very useful. These outage maps would need to be functional enough for IT and emergency response entities to zoom in on particular areas in order to help determine unreported needs and available resources to address them.

2. Are there any actions that the FCC should consider to improve the communications industry response to hurricanes? If so, what would those be?

   Ensure that Public Safety Agencies indeed do have priority access to voice and data communications during and after hurricane events.

3. The FCC provided information to the industry and the public before and during the course of hurricane season. For example, the FCC released public notices providing information, including but not limited to, emergency contact information for the FCC's 24/7 center and process guidance on seeking waivers/STAs.[2] The FCC also created event-specific webpages to share information such as communications status reports, public notices, and orders.[3] Was this information helpful? Is there additional information or assistance that the FCC should provide at the beginning or during an event?

4. How effective were the FCC's responses with respect to RFIs, RFAs, and requests for STAs and waiver requests? Do the processes for handling these requests need improvement and, if so, how can they best be improved?

   The FCC's responses were excellent.

5. To what extent did the data provided by DIRS aid response efforts? Is there additional information, including licensee information, which would improve response and coordination efforts?
6. The FCC monitors radiofrequency spectrum via deployed and/or fixed sensors to determine operational status of licensees. Were the reports related to such efforts effective in improving response of federal and SLTT partners? Should the FCC take actions to provide awareness and education on these capabilities?

   Additional education on these capabilities would be beneficial.

7. The FCC provides assistance to industry, first responders, and others in coordinating ad hoc emergency uses of spectrum in the affected areas. To what extent was the coordination process effective?

   The City did not require these services.

8. Were there interoperability issues among local spectrum users and those that arrived to assist in response? If yes, to what extent and how were they resolved? To what extent was unlicensed spectrum used and were there interoperability issues?

   There were some limited issues mostly involving coordination of Federal responders such as Urban Search and Rescue Teams. The USAR teams have their own frequencies but did not communicate effectively with the State or Local ESF2/COM-L entities. Also, some agencies responded with their own radios and expected to have them reprogrammed with the necessary talk groups / channels after arriving on scene. This quickly became a logistics challenge and caused some delays getting the resources deployed. We changed strategies and went exclusively to loaning radios that were already properly programmed. This worked based on the available cache of radios as well as loaner radios provided by our contract vendor.

9. Should the FCC publicly post information about interoperable channels assignments to facilitate spectrum coordination?

   Yes, all Interoperability information should be shared with and known by all Public Safety Agencies.

   Most conventional channels are already published in the National Incident Field Operations Guide (NIFOG). However, we used a great number of local/regional interoperable talk groups on our trunked system as the coverage and reliability is better. Publishing that sort of information may prove to be challenging both initially and on-going.

C. Questions Regarding Communications Service User Experience

1. To what extent did government agencies issue emergency alerts to the public, particularly over the Emergency Alert System (EAS) and the Wireless Emergency Alerts (WEA)? What other alerting methods were used? Were those communications effective? For example, were the alerts easy to understand, read, and geographically accurate? Were they accessible to people with disabilities and sent in languages other than English? Were there consumers that the alerts did not or could not reach? If public safety officials chose not to use EAS or WEA, why not?

   Frequently, the alerts would be broadcast in written English, and there was not an accompanying visible sign language interpreter with the alert. Sign language interpreters were frequently cut out of camera causing a communication gap for individuals who were deaf or hard of hearing. Further, for many televisions/ monitors with enhanced broadcasts, alerts or captioning were often covered up by other streaming content. The FCC should issue technical guidance that requires that American Sign Language alerts be broadcast along with standard alerts. When individuals went to large central shelters, like the George R. Brown Convention Center or the NRG Reliant Stadium, sign language interpreters were not in place and deaf individuals could not access the emergency alerts and messages being broadcast at the shelter. The FCC should provide funding to shelter management entities and local government agencies to provide more real-time accessible communications in shelters.

2. Were consumers able to effectively reach 911 services via voice and/or text (where text-to 911 was available) during and after the hurricanes? If not, why not? Are there actions that the FCC should take to improve 911 resiliency and reliability during events such as the hurricanes?

   The Houston Emergency Center (HEC) experienced a ten-fold increase in 911 call volume during the peak of Hurricane Harvey. An average of about 6000, 911 calls are received each day normally; during the peak day of the hurricane (Sunday, August 27, 2017), HEC received 60,000, 911 calls and answered 40,000 of those calls. During prior hurricane events, HEC received approximately 12,000 calls during the peak day. What differed during Hurricane Harvey from past hurricane events was the massive amount of flooding Houston experienced over several days. Much of this call volume increase was caused by callers dialing 911 and then hanging up after what they deemed to be too long of a wait time and then redialing 911. This exacerbated the problem as callers called 911 multiple times for a single event (i.e., one person calls 10 times for assistance with a high-water incident). HEC remedied the problem by placing a recording on the 911 phone line indicating that callers should stay on the line and not hang up, that calls were answered in the order that they were received. The volume of 911 calls HEC received dropped dramatically after this recording was put in place.

   The increase in 911 calls made it difficult for individuals to get through to emergency responders. Many power-dependent people with disabilities were on hold for extended periods of time waiting to get through to 911, and few were successful. The depleted battery in their mobile phones made it difficult for them to reach out to other resources for help when they failed to get through to 911. Individuals have limited dexterity or mobility either due to developmental disabilities or disabilities like arthritis had trouble dialing repeatedly. An older, disabled woman reached out to the MOPD when she could not get through to 911, and when instructed to call 911, she stated that, "It hurt too much to dial again." Individuals who use augmented communication devices like iPads to speak also experienced difficulty continually dialing while keeping their devices charged so they could communicate.

3. Were emergency communications services available to people with disabilities and others with specific communications needs? What actions can be taken to improve emergency communications for these communities?

   The deaf and hard of hearing community was able to reach 911 via text-to-911 from their cell phones and via TTY (teletypewriter).

   Texas uses the State of Texas Emergency Assistance Registry (STEAR). In theory, people with disabilities can register with STEAR so that they can receive assistance evacuating during a disaster. Many people with disabilities registered with STEAR and expected that they would receive assistance that emergency responders when their homes started flooding. They repeatedly called 911 and 211 and received no assistance. The State of Texas makes it clear that registering with STEAR does not guarantee assistance with evacuation, however, for Harvey, because broad evacuations were not ordered, only six individuals were actively contacted through the STEAR database. Many power-dependent people with disabilities received water in their homes and needed to be evacuated, despite the lack of an official evacuation order. States and localities are increasingly using databases/registries like this. The FCC should issue guidance on best communications practices for entities using a disaster response assistance registry for people with disabilities. Such guidance could assist in getting more people with disabilities more consistent, responsive interactions with emergency workers.

4. Were consumer complaints related to communications outages responded to by service providers in an appropriate and expedited manner? Is there any action that the FCC should take to improve this process?

5. To what extent were the operations of Public Safety Answering Points (PSAPs) affected by the hurricanes? Were PSAPs able to receive 911 calls during the storms, and if so, did redundancy and diversity in the circuits to the PSAPs contribute significantly to 911 reliability? Were PSAPs able to handle the call volume before, during and after landfall? Did PSAPs receive prioritized restoration for their service outages?

   HEC received 911 calls from other jurisdictions as cellular service providers' cell towers were overloaded and these 911 calls were misdirected to HEC. This added to the dramatic increase in HEC's 911 call volume and tied up 911 call takers who had to transfer those 911 calls back out to their appropriate PSAP(s). 911 service never went out at the HEC PSAP.

6. To what extent were first responders able to use their own wireless communications networks and devices? If not, what alternatives were used, if any? What was their experience with land mobile radio and microwave radio services in each hurricane?

   The Houston Fire Department (HFD) did not experience any prolonged operational outages on their primary communication medium (P25 radio system). The full extent of the radio systems capabilities was available throughout the response period of Hurricane Harvey and the aftermath.

Wireless networks in the immediate area of Houston stayed up and operational with only limited, localized interruptions. Therefore, first responders were able to use cellular voice and data when network demands allowed. There was still some network congestion but based on the continued availability of the network, it had little impact. LMR was heavily used and stayed operational throughout the incident. The LMR networks in Houston rely on microwave as transport medium. There were some very limited link failures during the extreme portions of the storm but due to the redundant design were not service impacting.

7. The FCC oversees the National Security/Emergency Preparedness (NSEP) priority service programs, which provide for service restoration and provisioning and mobile wireless and wireline priority.[4] To what extent were the priority service programs effective? Did NSEP users receive improved performance (higher percentage of call completion) when using the Government Emergency Telecommunication Service (GETS) and Wireless Priority Services (WPS)[5] compared to non-prioritized voice calls? If not, why not? Were GETS calling cards distributed across emergency responder organizations? Were emergency responder cell phones equipped with WPS? Are there any actions that the FCC could take to improve the effective use of the priority services programs?

   1. To what extent were the priority service program effective?

   Priority service allows uninterrupted service for key personnel to communicate essential information during and after catastrophic events. During Hurricane Harvey, all members of Emergency Operations and HFD Command Staff were placed on the essential personnel list for the COH reported no communication failure or interruptions.

   2. Did NSEP users receive improved performance when using (GETS) and (WPS)?

   We have not polled the end users of (GETS) and (WPS), however there were no concerns brought forward about performance depreciation during the event.

   3. Were (GETS) calling cards distributed across emergency responder organizations?

   Yes, the (GETS) cards were distributed across emergency organizations through the Houston Office of Emergency Management. The HFD received updated cards 12/15/2017.

   4. Were emergency responder cell phones equipped with WPS?

   Only selected essential personnel were allowed (GETS) and (WPS) communication features. The City had personnel enrolled in GETS and WPS and there were no reported issues with the two services.

8. To what extent were response efforts facilitated by amateur radio operators? Going forward, should efforts be made to increase the use of amateur radio services in connection with the planning, testing and provision of emergency response and recovery communications?

The City staged amateur radio operators within the Emergency Operations Center but due to the continued availability of our communication systems, the amateur operators were not utilized.

D. Questions Regarding Communications Service Provider Experience

1. To what extent were service providers able to pre-position equipment, supplies, and/or resources close to the affected areas in advance of each hurricane? How did this impact the continued availability of communications services or facilitate recovery?

   The City's contract provider, Verizon Wireless, did an outstanding job of pre-positioning equipment, supplies, and staff. They were instrumental in providing the City with alternate office spaces, wireless connectivity, and additional devices for our response personnel. They assigned key resources to our EOC and worked with us throughout the response period.

2. Did small and rural providers, including those serving Puerto Rico and the U.S Virgin Islands, face any unique challenges in preparing for, responding to and recovering from the hurricanes?

3. Was radio frequency information shared among service providers? Were there instances of interference and were they resolved in a timely and effective manner?

4. How could DIRS notices sent to participating communications providers during the storms be improved? Were there any problems/issues in reporting outage information into DIRS? Should DIRS be modified to improve user experience, and if so, how?

5. What were the most effective means to restore connectivity to the communications infrastructure (*e.g*. backhaul, last mile) and how long did it take to do so?

   a. Utilizing backup generators helped to make data communications within HPD more reliable, however failure by other city departments to refill fuel tanks caused extended outages when the generators failed.
   b. Telco providers dispatched their technicians to restore services for sites were roadways and paths were clear to get to them. In some cases, it took a few hours and in other cases it took several days.

6. Were communications services, such as satellite services, mobile ad-hoc networks, Wi-Fi services, mesh-based communications architectures, experimental projects or other services/technologies used and effective in providing connectivity when other services were limited or down? Should the FCC encourage inclusion of these services in future mitigation plans?

   Wi-Fi services were a critical component in restoring services for key operations that could no longer occupy their facilities. Verizon provided temporary mobile offices complete with Wi-Fi service and devices.

7. Were service providers able to route 911 calls effectively to PSAPs or alternate numbers permitted under the rules?[6]

   HEC received 911 calls from other jurisdictions as cellular service providers' cell towers were overloaded and these 911 calls were misdirected to HEC. This added to the dramatic increase in HEC's 911 call volume and tied up 911 call takers who had to transfer those 911 calls back out to their appropriate PSAP(s).

8. What were the obstacles to rapidly restoring communications systems? To what extent did these impediments impact and/or extend the duration of outages? Were FCC efforts to address the impediments helpful?[7]

9. Were there challenges with the use of back-up power for network equipment? Are there ways to improve the ability of communications infrastructure to operate when commercial power is lost?

   Yes – Backup power systems worked, but failure of other city departments to ensure that generator fuel tanks were refilled caused extensive outages when tanks ran dry and generators lost their prime. Having readily available fuel trucks in key locations and an automated system to request timely refills for generators would be helpful.

10. To what extent was the Wireless Resiliency Framework and each of its elements, *i.e.* providing reasonable roaming under disaster agreements, providing mutual aid to carriers, enhancing municipal preparedness, increasing consumer readiness, and posting data in DIRS, effective in each hurricane-impacted area?[8] Were there examples of positive impacts and/or deficiencies in the utilization of the Framework, and, if so, what should be improved?

11. Does the market and/or government, currently offer sufficient incentives to encourage the build-out and maintenance of resilient communications infrastructure? Are there actions that the FCC should take to encourage industry to build and maintain a resilient communications infrastructure?

12. What was the impact of the hurricanes on broadcast radio and television services? Did broadcasters face any unique challenges in the face of any of the four hurricanes? To what extent did broadcast-specific best practices exist prior to the hurricanes? Were they implemented? If so, did they prove effective?